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Maine Agricultural Experiment Station

BULLETIN No. 115.

APRIL, 1905.

FEEDING STUFF INSPECTION. COTTONSEED MEAL.

This bulletin contains the analyses of samples of Feeding Stuffs received from correspondents and collected by the inspector in the fall and winter, 1904-5, a discussion of the results of the inspection, and the report of studies upon cottonseed meal.

Requests for bulletins should be addressed to the
AGRICULTURAL EXPERIMENT STATION,
Orono, Maine.

MAINE

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ORONO, MAINE.

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FEEDING STUFF INSPECTION.

CHAS. D. WOODS, Director.

J. M. BARTLETT, Chemist in charge of feeding stuff analyses.

CHIEF REQUIREMENTS OF THE LAW.

The points of the law of most interest both to the dealer and consumer concisely stated, follow.

Kinds of Feed Exempt Under the Law. The law applies to all feeding stuffs *except* the following: hays and straws; whole seeds, meals, brans and middlings of wheat, rye, barley, oats, Indian corn, buckwheat and broom corn, sold separately; wheat bran and middlings mixed together and pure grains ground together.

Kinds of Feed Coming within the Law. The principal feeds coming under the provisions of the law are linseed meals, cottonseed meals, cottonseed feeds, pea meals, cocoanut meals, gluten meals, gluten feeds, maize feeds, starch feeds, sugar feeds, dried brewers' grains, dried distillers' grains, malt sprouts, hominy feeds, cerealine feeds, rice meals, oat feeds, corn and oat chops, corn and oat feeds, corn bran, ground beef or fish scraps, condimental foods, poultry foods, stock foods, patented proprietary and trade-marked stock and poultry foods, mixed feeds other than those composed solely of wheat bran and middlings mixed together or pure grains ground together, and all other materials of similar nature.

The Brand. Each package of feeding stuffs coming within the law shall bear, conspicuously printed, the following statements:

The number of net pounds contained in the package.

The name or trade-mark under which it is sold.

The name of the manufacturer or shipper.

The place of manufacture.

The place of business of manufacturer or shipper.

The percentage of crude protein.

The percentage of crude fat.

The Adulteration of Feeding Stuffs. If any foreign substances are added to whole or ground grain or wheat offals, the true mixture must be plainly marked upon the packages.

Duties of the Director. The Director shall in person or by deputy analyze at least one sample of each feeding stuff coming within the requirements of the law, and publish the results with such additional information as circumstances advise. He shall report all violations of the law to the Commissioner of Agriculture.

Penalties. The sale or offering for sale of feeding stuffs not properly branded, or containing a smaller percentage of protein and fat than are guaranteed, or of adulterated feeding stuffs, is punishable by a fine not exceeding 100 dollars for the first, and \$200 for each subsequent offense.

THE RESULTS OF THE INSPECTION FOR 1904-5.

The last bulletin on feeding stuff inspection was published in April, 1904. It contained the results of a large number of analyses of feeding stuffs collected in different parts of the State. The present year more attention has been paid to the *inspection* and less to analyses. A station chemist, experienced in feeding stuff analyses, has visited the chief dealers four times during the season. Samples have been drawn so that at least one sample has been taken of all goods found that come under the requirements of the law. Beyond that, the chief duties of the inspector have been to see that the provisions of the law were being complied with, and to carefully examine the stock in the hands of the dealers for adulterated or falsely branded goods. In no season in the seven years that the law has been in effect has the market been so free from poor goods. The following table gives the results of the analyses.

The results are discussed on page 59 and following.

Analyses of Samples.

Name of Feed and Manufacturer or Shipper.	PROTEIN.		FAT.		Station number.
	Found— per cent.	Guaranteed— per cent.	Found— per cent.	Guaranteed— per cent.	
Cotton Seed Meal	45.44	43.00	8.20	9.00	10756
Paris Flouring Co.....					
Crescent Cotton Seed Meal.....	43.06	43.00	11.07	9.00	10747
Crescent Cotton Oil Co., Memphis.....					
Dixie Brand Cotton Seed Meal.....	41.50	43.00	10.00	9.00	10723
Humphreys, Goodwin & Co.....	40.56	43.00	-	9.00	10738
	41.63	43.00	-	9.00	10741
	42.06	43.00	-	9.00	10742
Eagle Brand Cotton Seed Meal	42.25	43.00	10.31	9.00	10765
W. A. Kaiser & Co., Memphis					
Green Diamond Brand, Cotton Seed Meal	42.13	43.00	6.26	9.00	10694
Chapin & Co., St. Louis.....	42.10	43.00	-	9.00	10718
	40.88	43.00	-	9.00	10632
	40.00	43.00	-	9.00	10633
Horse Shoe Brand Cotton Seed Meal	42.25	43.00	-	9.00	10634
Hugh Petette & Co., Memphis.....	42.50	43.00	-	9.00	10635
	42.75	43.00	9.99	9.00	10636
	40.00	43.00	-	9.00	10637
	46.38	40.00	-	8.50	10634
	42.63	40.00	-	8.50	10644
Indian Brand Cotton Seed Meal	46.31	40.00	-	8.50	10649
National Cotton Seed Products Co., Memphis	40.06	40.00	-	8.50	10651
Tenn.....	43.94	40.00	-	8.50	10671
	38.00	40.00	8.52	8.50	10713
Magnolia Brand Cotton Seed Meal	42.50	43.00	8.95	9.00	10753
Chas. M. Cox & Co., Boston					
Old Gold Cotton Seed Meal.....	46.88	43.00	8.28	9.00	10698
T. H. Bunch, Memphis.....	40.88	43.00	-	9.00	10776
	42.38	43.00	-	9.00	10796
Owl Brand Cotton Seed Meal	46.13	43.00	-	9.00	10675
F. W. Brode & Co	46.06	43.00	8.92	9.00	10689
	40.50	41.00	-	7.00	10800
Phenix Cotton Seed Meal	42.63	43.00	8.17	9.00	10759
D. L. Marshall, Agent	40.31	43.00	-	9.00	10751
Prime Cotton Seed Meal	41.50	43.00	-	9.00	10658
American Cotton Oil Co.....	43.88	43.00	8.52	9.00	10682
Prime Cotton Seed Meal	43.75	43.00	8.87	9.00	10755
H. E. Bridges & Co					
Prime Cotton Seed Meal	40.69	43.00	-	9.00	10798
A. R. Hopkins Co					
Prime Cotton Seed Meal	37.50	43.00	-	9.00	10614
Hunter Bros. Milling Co.....	46.44	43.00	8.45	9.00	10696
	40.00	43.00	-	9.00	10795
Prime Cotton Seed Meal	43.56	43.00	9.67	9.00	10697
McKellar Bros.....					
Prime Cotton Seed Meal.....	45.56	43.00	8.27	9.00	10768
J. E. Soper & Co					

Analyses of Samples.

Name of Feed and Manufacturer or Shipper.	PROTEIN.		FAT.		Station number.
	Found— per cent.	Guaranteed— per cent.	Found— per cent.	Guaranteed— per cent.	
Star Brand Cotton Seed Meal Sledge & Wells Co., Memphis	43.25	43.00	-	9.00	10631
	43.63	43.00	-	9.00	10638
	43.13	43.00	-	9.00	10639
	42.50	43.00	-	9.00	10640
	43.63	43.00	-	9.00	10641
	43.63	43.00	-	9.00	10642
	41.75	43.00	-	9.00	10740
	39.25	43.00	11.07	9.00	10763
	41.63	43.00	-	9.00	10786
	41.63	43.00	-	9.00	10787
	42.38	43.00	-	9.00	10788
Southern Beauty Cotton Seed Meal J. G. Falls & Co., Memphis	41.19	43.00	-	9.00	10716
	41.44	43.00	11.32	9.00	10729
Sunny South Cotton Seed Meal Sledge & Wells Co., Memphis	22.56	25.00	5.90	6.00	10722
Chicago Gluten Meal Glucose Sugar Refining Co	34.88	38.00	3.12	3.00	10683
Gluten Meal Doten Grain Co.	36.81	39.81	5.68	5.42	10619
* Gluten Meal..... Huron Milling Co	40.06	-	6.27	-	10657
	35.31	-	-	-	10664
	33.75	-	-	-	10672
	41.88	-	-	-	10673
	45.88	-	-	-	10679
Buffalo Gluten Feed Glucose Sugar Refining Co.....	22.63	28.00	2.44	3.00	10684
	20.63	28.00	-	3.00	10799
Contiuentual Gluten Feed Continental Cereal Co	31.35	35.00	-	12.50	10744
	34.06	35.00	12.68	13.00	10760
Globe Gluten Feed New York Glucose Co.....	27.00	27.00	2.45	3.38	10754
* Gluten Feed..... Huron Milling Co	24.13	-	-	-	10656
	25.88	-	-	-	10662
	28.94	-	-	-	10663
Jinks Gluten Feed Huron Milling Co	*17.31	27.00	8.62	7.50	10710
	27.56	27.00	-	7.50	10750
	27.56	27.00	-	7.50	10758
Pekin Gluten Feed..... Illinois Sugar Refining Co ..	25.19	28.00	3.47	3.00	10691
Tiger Gluten Feed St. Louis Syrup and Preserving Co.....	27.13	28.00	3.85	2.96	10773
	24.69	28.00	-	2.96	10779
Warner Gluten Feed Warner Sugar Refining Co	23.50	27.50	3.74	3.00	10661
	24.63	27.50	-	3.00	10674
	24.13	27.50	3.35	3.00	10764
Green Oval Old Process Linseed Oil Meal..... Flint Milling Co., Milwaukee and Buffalo ...	32.00	32.00	7.60	5.00	10707

* See discussion page 61.

Analyses of Samples.

Name of Feed and Manufacturer or Shipper.	PROTEIN.		FAT.		Station number.
	Found— per cent.	Guaranteed— per cent.	Found— per cent.	Guaranteed— per cent.	
Linseed Oil Meal.....	37.88	38.00	2.47	1.00	10695
American Linseed Co					
Old Process Oil Meal	35.38	32.00	7.40	5.00	10692
American Linseed Co					
Old Process Ground Linseed Cake	35.56	32.00	9.17	5.50	10712
Midland Linseed Co	31.13	32.00	8.62	5.00	10748
Old Process Oil Meal	31.38	32.00	7.72	5.00	10727
Metygar Linseed Oil Co					
Viscid Oil Meal.....	32.38	31.00	8.97	7.50	10693
Millwaukee Elevator Co.....	30.88	31.00	5.03	7.50	10717
Blatchford's Sugar and Flax Seed.....	27.94	28.25	10.98	11.25	10725
J. W. Boswell, Waukegan					
Ajax Flakes.....	31.13	34.00	15.52	12.00	10652
Chapin Co., Boston.....	33.31	34.00	14.80	12.00	10708
	30.50	34.00	-	12.00	10743
	30.13	34.00	-	12.00	10793
Biles Fourcx.....	31.63	33.00	12.15	11.00	10687
J. W. Biles Co., Cincinnati					
Dirigo High Grade Corn Grains	31.75	33.00	11.03	11.00	10731
Peoria Distillers' Dried Grain	37.38	33.00	11.72	11.00	10702
American Milling Co					
Union Grains.....	22.38	24.00	-	7.00	10615
J. W. Biles Co., Cincinnati.....	24.75	24.00	7.78	7.00	10686
Armour's Beef Scraps	45.88	-	42.95	-	10749
Armour Fertilizer Works					
Beef Scraps.....	44.63	40.00	17.37	15.00	10794
Portland Rendering Co.....					
Bowker's Animal Meal	43.88	30.00	11.76	5.00	10721
Bowker Co. Boston					
Bowker's Fresh Ground Beef Scrap.....	52.19	30.00	13.40	20.00	10699
Bowker Co.....					
Bradley's Superior Meat Meal	42.50	30.00	10.65	8.00	10757
American Agricultural Chemical Co					
Brand L. Beef Scrap.....	50.00	-	-	-	10629
Swift Lowell Fertilizer Co.....					
Brookside Farm Ground Bone and Scrap.....	38.69	39.10	32.67	35.67	10734
S. H. Nash, Brewer.....					
Dow's Beef Scrap	44.38	30.00	19.20	15.00	10732
John C. Dow Co., Boston					
Swift's Lowell Bone and Meat Meal	37.00	40.00	11.97	8.00	10724
Swift Lowell Fertilizer Co					

Analyses of Samples.

Name of Feed and Manufacturer or Shipper.	PROTEIN.		FAT.		Station number.
	Found— per cent.	Guaranteed— per cent.	Found— per cent.	Guaranteed— per cent.	
Boss Corn and Oat Feed..... } Great Western Cereal Co..... }	7.50	9.00	4.20	4.00	10701
Empire Stock Feed } Empire Mills, Olean, N. Y..... }	8.44 8.00	7.63 7.63	4.08 3.65	2.97 2.97	10668 10690
Excelsior Stock Feed..... } Great Western Cereal Co..... }	8.63	9.00	5.22	4.20	10700
Gee's Extra Fancy Sharps Middlings } Gee Grain Co., Minn }	12.38 13.56	13.25 13.25	2.17 —	2.67 2.07	10620 10648
Haskell's Stock Feed } W. H. Haskell & Co }	8.69	10.00	4.09	6.25	10667
H-O Co.'s Horse Feed..... } H-O Co., Buffalo..... }	12.31	12.00	5.05	4.50	10767
Hominy Feed..... } Chas. M. Cox, Boston }	9.75	10.50	6.32	7.50	10766
Hominy Feed..... } Suffern Hunt & Co..... }	10.75	11.02	8.65	7.70	10761
Joko Poultry Food*..... } Isaac C. Stetson,Damariscotta..... }	21.12	—	4.68	—	10653
New England Stock Feed..... } H-O Co.'s Mills, Buffalo }	10.06	10.00	4.15	4.00	10711
Protena Dairy Feed*..... } Purina Mills }	20.38	—	3.89	—	10769
Schumacher's Stock Feed } American Cereal Co }	12.38	13.00	3.44	5.00	10709
Victor Corn and Oat Feed..... } American Cereal Co..... }	8.75	9.00	3.28	4.00	10704
Vim Oat Feed } American Cereal Co..... }	6.50	7.50	2.41	2.75	10752
Worthmore Hominy Feed..... } Chas. M. Cox Co., Boston..... }	9.88	10.50	6.35	7.50	10621
Acme Feed } Acme Milling Co..... }	16.75	—	4.65	—	10705
Adrian Bran..... } Detroit Milling Co }	14.81	—	—	—	10736
Blish Mixed Feed } Blish Milling Co..... }	15.31 14.50	— —	5.23 3.91	— —	10654 10703
Feed Flour..... } Brooks, Evaton Co..... }	13.50	—	—	—	10647
Feed Flour..... } Jennings & Fulton, Boston..... }	14.06	—	—	—	10665

* Manufacturer's sample.

Analyses of Samples.

Name of Feed and Manufacturer or Shipper.	PROTEIN.		FAT.		Station number.
	Found-- per cent.	Guaranteed-- per cent.	Found-- per cent.	Guaranteed-- per cent.	
Golden Ball Mixed Feed Lawrenceberg Roller Mills, Indiana	15.63	-	-	-	10737
Mixed Feed..... Huron Milling Co	12.06	-	-	-	10735
Mixed Feed..... Ohio Cereal Co	15.50	-	-	-	10680
Mixed Feed..... Lawrenceberg Roller Mills, Indiana.....	16.40	-	-	-	10720
Mixed Bran and Shorts..... Farmers Milling Co.....	16.63	-	-	-	10676
Peerless Mixed Feed	14.93 15.13	- -	- -	- -	10646 10726
Pillsbury's Daisy Feed Flour	20.75	-	-	-	10630
Vermont Mixed Flour..... Flint Mill Co.....	15.06	-	4.50	-	10728
Winterwheat Bran..... Lawrenceberg Roller Mills, Ind	15.00	-	-	-	10719
Worthmore Wheat feed..... C. M. Cox Co. Boston	16.38	17.00	4.95	4.00	10685
Blue Grass Mixed Feed	10.88	-	2.30	-	10677
A. Waller & Co., Henderson, Ky.....					
Indiana Mixed Feed.....	11.00 11.38	- -	3.07 -	- -	10762 10778
Jersey Mixed Feed	10.63	11.00	3.00	3.00	10733
Kentucky Milling Co					

DISCUSSION OF THE RESULTS OF ANALYSES.

With so limited an amount of money as the State appropriates for the purpose of the inspection of the sale of feeding stuffs, it is not possible to make in any given year as exhaustive a study, either in the field or the laboratory, as is desirable. From the standpoint of the average purchaser of commercial feeding stuffs in this State, protein is the most important constituent, and is always determined in all samples collected. In at least one sample of each brand collected, the fat (ether extract) is determined. In special cases further studies, particularly of the

amount of crude fiber, are made. An extensive study of low grade compared with high grade cottonseed meal has been made, and is reported on pages 71-76 beyond. More and more the jobbers of feeding stuffs are looking to the Station for its opinion on new feeds, and the result has been that during the past year an increasing number of samples have come from the large handlers of feeding stuffs, who wished to learn the chemical analysis of new goods before deciding whether they would handle them or not. In this way the consumer is getting a protection that a few years ago would have seemed impossible.

COTTONSEED MEAL (ANALYSES PAGES 55 AND 56.)

Cottonseed meal is a by-product from the manufacture of cottonseed oil. After the cotton has been taken from the seed in the cotton gin, the remaining down or "linters," and the hard black seed coats or hulls are removed by machinery. What remains of the seed is cooked, and the oil expressed by high pressure. The resulting cottonseed cake is ground into the bright yellow cottonseed meal of commerce. Such a meal carries from 40 to 50 per cent protein.

The shippers of cottonseed meal for the most part guarantee 43 per cent protein and 9 per cent fat. According to the classification of the Cotton Seed Crushers' Association, "prime" cottonseed meal from the Gulf States must carry not less than $7\frac{1}{2}$ per cent ammonia. As 8 per cent ammonia is equivalent to only 41.19 per cent protein, it is evident that the minimum guarantee is placed higher by the shippers than the association calls for in prime meal. Hence a meal that carries 41 per cent protein is "prime" in the trade sense, but is below the guarantee usually placed upon cottonseed meal sold in Maine.

The National Cotton Seed Products Company are putting a guarantee of 41 per cent protein and 8.50 per cent fat on their Indian brand cottonseed meal and F. W. Brode are at least occasionally putting a guarantee of 41 per cent protein and 7 per cent fat on their Owl brand. Both of these meals are on the average as good as any sold in the State and it would probably be much better if the other companies doing business in the State were to lower guarantees for protein to the standard of the Cotton Seed Crushers' Association.

While the cottonseed meal sold in the State has for the most part been of good quality, the number of samples that have run above 43 per cent have been less than they were a few years ago. The Star brand cottonseed meal of the Sledge & Wells Company, that a year ago was running poor, has this season been as high in protein content as most other brands. While half of the samples of this brand carried a trifle over 43 per cent protein, a guarantee of 41 per cent would have placed their goods above criticism so far as protein content is concerned. The Dixie brand of Humphreys, Goodwin and Co., the Eagle brand of W. A. Kaiser and Co., the Green Diamond brand of Chapin & Co., the Horse Shoe brand of Hugh Petette and Co., the Magnolia brand of Chas. M. Cox and Co., two of the three samples of the Old Gold brand of T. H. Bunch, the Phoenix brand, D. L. Marshall, agent, and Southern Beauty brand of J. G. Falls & Co., and the prime cottonseed meal of A. R. Hopkins and Co., and Hunter Bros. Milling Co., were below 43 per cent in protein. All these brands would better be guaranteed 41 per cent protein and 8 per cent fat.

One sample of low grade cottonseed meal, Sunny South brand of Sledge and Wells, was found in the hands of a small retailer. This carried 22.56 per cent protein and 5.90 per cent fat with a guarantee of 25 per cent protein and 6 per cent fat.

GLUTEN MEALS AND FEEDS (ANALYSES PAGE 56.)

Gluten meals and gluten feeds are by-products left in the manufacture of starch and glucose from Indian corn. Gluten feeds differ from gluten meals in that they contain a good deal of the corn bran, and hence relatively less of protein, fat and digestible carbo-hydrates, and more of the indigestible woody fiber.

Gluten products continue to be the most unsatisfactory of any concentrated feeds on the market. This is partly because different lots of the same brand vary somewhat in composition, but is chiefly because certain companies persist in putting a guarantee upon their goods that the goods do not come up to in any instance. This trouble is general throughout the New England States. The Glucose Sugar Refining Company is perhaps the worst offender, but the Continental Cereal Company, the

Illinois Sugar Refining Company, and the Warner Sugar Refining Co., are also makers of brands whose guarantees must be discounted.

The single sample examined of the Globe gluten feed of the New York Glucose Company, and two of the samples of the Jinks gluten feed of the Huron Milling Co., were up to their guarantee of 27 per cent protein. Twenty-five per cent protein and 3 per cent fat is about all that a gluten feed can be counted upon as carrying.

Five samples of gluten meal and three samples of gluten feed from one car shipped by the Huron Milling Company were received from the state agents. The goods were exceedingly variable, the meal carrying from about 34 to 46 per cent protein, and the feed from about 24 to 29 per cent protein. It was said in explanation that the company were experimenting with new machinery and methods of separation. One sample of Jinks gluten feed made by the same company sent in by a correspondent ran exceptionally low in protein. As two samples collected by the Station representative were well up in protein content, it would seem there must be some explanation, such as faulty sampling, to account for this abnormal specimen.

LINSEED MEAL (ANALYSES PAGES 56 AND 57.)

Linseed meal is made by grinding flax seed from which the oil has been more or less completely removed. "Old process" meal is made from oil cake, from which as much as possible of the oil has been removed by pressure. In the "new process" the oil is extracted by the use of naphtha. Old process meal carries more fat and less protein than new process. Because of the method of manufacture, new process meal is somewhat more uniform in composition. Most of the oil meal was up to its guarantee in protein. No evidence of any adulteration of this class of feeds was found. Because of the relatively lower price, linseed meal is coming into quite general use again.

VISCID OIL MEAL (ANALYSES PAGE 57.)

Oil meal is quite a common trade name for old process linseed meal, and for this reason the use of the term as part of the name of a product made from other materials is to be deprecated.

Two samples of these goods were examined. The manufacturers submitted for analysis a sample of Viscid Oil Meal which we examined with the following results.

Water	7.98	per cent.
Ash	6.58	"
Protein	30.88	"
Crude fiber	11.86	"
Nitrogen-free extract	37.67	"
Fat	5.03	"

About the same time (December, 1904) a sample was taken from stock by the inspector. This sample carried 32.38 per cent protein and 8.97 per cent fat.

From the chemical composition the goods seem to have a good feeding value. The taste is (to a man) very unpleasant and it would seem doubtful if cattle would eat it readily. A feeding test would be necessary to answer the question as to its feeding value. Unless it could be bought for a much lower price than good oil meal, it would seem to be a good feed to let alone, for the present.

DISTILLERS' GRAINS (ANALYSES PAGE 57.)

Dried distillers' grains resemble in composition the gluten feeds. They are, however, much more bulky. They are derived chiefly from corn from which the starch is removed by fermentation. A feeding experiment conducted at this Station* showed these grains to be a valuable source of protein.

Four brands of these grains are now offered in Maine. Ajax Flakes of Chapin & Co., are guaranteed 34 per cent protein and 12 per cent fat, the three other brands are guaranteed 33 per cent protein and 11 per cent fat. The protein of the Ajax Flakes, Biles Fourex and Dirigo High Grade Corn Grains run a little below their guarantees. It would more nearly correspond to fact if these brands were all guaranteed 31 per cent protein, for that is about all the consumer can count upon from them.

The one sample examined of the Peoria Distillers' Dried Grains carried the phenomenal amount of 37.38 per cent pro-

* Bulletin 92, page 65.

tein. After the high protein content of this sample was ascertained, it has not been practicable to procure a sample from another shipment to see if this was accidental or if it regularly carries this large amount of protein. The goods have not been reported by other New England stations.

UNION GRAINS (ANALYSES PAGE 57.)

Union grains are a ready made mixture, carrying for the most part the protein and fat according to the guarantee. They are based upon a feeding experiment with Holstein cattle in which Biles Fouxex was fed in combination with wheat bran, gluten feed, ground corn, ground oats, and oil meal. For the farmer who must buy all his feeds, Union grains at a fair price would probably prove profitable. As a rule, oats and corn are profitable for cows when the feeds are home grown and expensive feeds to purchase. A feeding test at this Station with Union grains is reported in Bulletin 106.

MEAT MEALS AND GROUND SCRAPS (ANALYSES PAGE 57.)

The meat meals and ground beef scraps are used chiefly for feeding poultry, and while they are very generally distributed, it is probable that the sales are not large as compared with other materials coming under the feeding stuffs law. The guarantees placed upon the goods are only a very general guide to the actual composition. While all the brands are quite irregular in composition, some uniformly run higher in protein than others.

MISCELLANEOUS FEEDING STUFFS (ANALYSES PAGE 58.)

The use of the various oat feeds, corn chops, corn and oat feeds and similar offals by themselves, or blended with concentrated feeds, still continues. They vary in composition from the straight oat hull refuse, with less than 6 per cent protein, to blends that carry from 15 to 18 per cent protein. For the most part these goods are fairly well up to their guarantees. No fault can be found with the manufacturer for desiring to sell these waste products. They make few claims for nutrients which the goods do not actually carry. The feeder has himself to blame if, with barns filled with hay, corn fodder and silage, he buys this class of feeds low in protein, instead of those high

in protein. An oat feed with 6 per cent protein is a little better feed and is somewhat better digested than oat straw with the same protein content. It is finely ground and saves some work in mastication for the animal that eats it. This class of goods carries from 12 to 17 per cent of indigestible woody fiber.

Gee's extra fancy sharps middlings are made from wheat refuses and the weed seeds removed in cleaning wheat before milling. They are not sold at such prices as to invite their use in preference to the materials they more or less resemble in protein content. The sample of Joko poultry food was sent for analysis by the maker; at that time it was not on the market.

Protena Dairy feed, made by the Purina Mills, is a new feeding stuff introduced late in the winter. Norton-Chapman Company of Portland are the State agents. They use as a basis in its manufacture, alfalfa meal "specially milled from the leaves and upper tendrils of the plants; with this we combine natural grains and concentrated feeds in such proportion as to give us a ration analyzing about as follows: 20.0 per cent protein, 3.5 per cent fat, 50.0 per cent carbohydrates."

The sample sent to us by the State agent analyzed as follows:

Water	6.85	per cent.
Ash	7.59	"
Protein	20.38	"
Crude fiber	18.87	"
Nitrogen-free extract	42.46	"
Fat	3.85	"

The Station arranged to make a feeding test with these goods, but was unable to do so the present season because of their failure to arrive in Bangor until so late in the year that it was feared that climatic causes would tend to make the results of a feeding trial uncertain.

Two samples of a "stock food" (not a condimental food) to be offered in the State were submitted by a jobbing house for examination. They analyzed as follows:

	Sample 10774	Sample 10785
Protein	7.63	7.31
Fat	—	3.97
Crude fiber	9.90	9.60
Nitrogen-free extract	3.85	"

These were a mixture of oat feed and hominy chop and were highly recommended by the manufacturers. In the letter reporting the results of the analyses, it was stated, "so far as its protein content is concerned, it has about the same feeding value as corn stalks. I do not believe it is the kind of feed that should be furnished to Maine feeders. For the most part, they can grow all of the feeds low in protein on their own farms, and when they purchase they should buy the concentrates that are high in protein." The goods were not offered in the State, so far as the writers know.

WHEAT BRAN AND MIDLINGS (ANALYSES PAGE 59.)

Only a few samples of the refuses from the milling of wheat were examined, and these for the most part were sent in by correspondents. Several of the brands have run much lower in protein than in years past. This was particularly true of the so-called mixed feed of the Huron Milling Company, which was found to carry only 12.06 per cent protein. It is not a mixed feed in the usual sense of the word, but was bran and apparently carried nothing but wheat bran. This particular sample was carefully examined under the microscope and was found to be free from foreign admixtures. Its crude fiber, 8.18 per cent, is about the average of that of winter wheat brans. The feed flour of the Brooks-Evaton Company is unusually low in protein, but we found no evidence in the sample submitted of adulteration.

ADULTERATED MIXED FEED (ANALYSES PAGE 59.)

In the fall of 1899 the State was flooded with low grade adulterated wheat brans and mixed feeds. Because of the publicity given to this class of goods and the co-operation of the best of the large dealers, they have quite largely disappeared, or else are sold under a proper guarantee. Three brands of this class of goods were found in the State this year. The Jersey mixed feed of the Kentucky Milling Company is guaranteed to carry 11 per cent protein and 3 per cent fat, while the sample examined carried only 10.63 per cent protein and 3 per cent fat. The Blue Grass mixed feed of A. Walls & Co., Henderson, Ky., was sent to us by a correspondent. This was without guaran-

tee; it carried 10.88 per cent protein, 2.30 per cent fat, and 15.80 per cent crude fiber. This is a mixture of winter wheat bran, middlings and cob meal. Of the Indiana mixed feed, two samples were obtained from the same car, one of which carried 11 per cent and the other 11.38 per cent protein and 3.07 per cent fat. The crude fiber in one of these samples was 16.40 and in the other 12.80 per cent. This, in composition and make-up, was very similar to the Blue Grass mixed feed containing wheat bran, middlings, and cob meal. If these goods are to be sold in Maine, they must not only carry the guarantee or percentage of protein and fat, but under section 32, chapter 39, of the Revised Statutes, defining the adulteration of mixed feeds, it is necessary to state the character of the admixture. It is to be hoped that the consumers will be so alive to their own interests that they will not purchase this class of feeds, no matter at what price they may be offered.

There is so much profit in selling ground corn cobs, broom corn and other valueless materials at the price of wheat bran, that the consumer must ever be on the watch against this fraud. The safest thing is to buy only well known reliable brands of this class of goods. If consumers will see to it that all of this class of feeds which they buy carries the name of the miller, there will be little likelihood of their being defrauded. In case of any doubt, any resident of Maine is invited to mail a sample to the Station. An analysis will be made and the results reported promptly without charge.

CORN MEAL.

The corn meal sold in the State is very largely locally ground and the Station inspector does not sample it. This year, because of two complaints, a special examination was made in two sections of the State.

In December, while at Lewiston, it was reported to the inspector that a firm in Augusta was grinding corn bran with their corn and thus making a low grade of corn meal, which they were putting on the market at the regular price of good corn meal. The same report was heard from a dealer in Augusta when the inspector reached that city. The inspector took two samples of

corn meal ground by the suspected firm. They analyzed as follows:

Sample No. 10,714 carried 9.38 per cent protein and 2.97 per cent fiber; sample No. 10,715 carried 9.50 per cent protein and 3.43 per cent fiber.

If enough corn bran had been added to have made it any object to use it for the purpose of adulteration, the crude fiber would have been much higher and the protein lower than the results of the analyses show. The average of 77 samples of corn meal show it to carry 9.2 per cent protein, and 2 per cent crude fiber. The fiber in the samples drawn at Augusta are somewhat higher than this average, but are no higher than samples of straight corn meal sometimes run.

In February a dealer in Oxford county wrote as follows: "There is a lot of corn meal shipped into this section that I have to compete with from which a part is bolted out and sold as "bolted" or "granulated" meal. The residue that is sold here as "meal" can, of course, be sold cheaper than anyone can who puts in the whole corn into the meal as I do."

On our request this correspondent sent a sample of his own meal and of the suspected meal. The analyses were made at once and were reported as follows:

"The two samples of corn meal which you sent us analyzed as follows:

	Suspected meal, per cent.	Straight meal, per cent.
Water	15.64	17.25
Protein	8.36	8.06
Crude fiber	2.41	2.18

Put upon the water free basis your meal would carry 9.74 per cent protein and the other 9.88 per cent. The fiber in your meal would be 2.64 per cent and the other 2.85. If these two samples of meal had been submitted to us without an explanatory letter, I should have written that they were practically alike in composition, but that the suspected one was a trifle the better, because of its lower water content and consequent larger content of dry matter."

In both of these cases there was no chemical evidence that the meals were not straight goods, and they had as high feeding value as the average corn meal.

CONDIMENTAL FOODS.

This subject is an old one and were it not for the large profits in the sale of these mixtures and the credulity of the race as regards nostrums, they would have long since disappeared from the markets. At more or less irregular intervals something has arisen to call for renewed attention to this class of usually harmless but expensive materials. The whole subject was tersely stated in the first report of this Station.* “The foods have no greater nutritive value than the feeding stuffs from which they are made. The small quantities of fenugreek and sulphur are utterly valueless to a well animal and are a poor reliance as a means of curing a sick one.”

This opinion was restated in 1895† in a more ample form. In 1896 a feeding experiment was made in which a herd of 5 cows were fed alternately for nine weeks with and without condimental food.‡ This experiment showed a slight falling off in milk production in the periods that the condimental food was used. In 1902 it seemed necessary to again refer to these articles,§ and now because of two samples submitted by a dealer, who stated that his customers were dissatisfied, and wanted their money back in accordance with the agreement on the package, it becomes necessary to again take up this rather threadbare subject. Strangely enough, 20 years ago it was the requested analyses of a stock food and of an egg producer that lead to the writing of the sentence above quoted. The Security Poultry Food and Egg Maker, Albuminized, and the Security Stock Food, Glutenized, here reported, are with some minor changes the same as the Imperial Egg Food, The Continental Food and the English Patent Food of two decades ago. The analyses of these modern marvels correspond as nearly to the analysis of wheat bran as did their precursors. If it were not for the sobering effects of the thought of the credulity and gullibility of the public exhibited by the continued expenditure for these materials, it would be difficult to treat the matter seriously. For men to pay at the rate of \$200 a ton for wheat bran to which

* Rep. Maine Station 1885, pages 52 and 53.

† Bul. 20, Maine Station.

‡ Rep. Maine Station 1896, pages 51-55.

§ Bul. 80, Maine Station, pages 62-63.

has been added charcoal, cayenne, rosin, salt, copperas, sulphur, gentian, Venetian red and possibly a few other materials of like nature, seems so much of a joke that it is not easy to appreciate the seriousness of the situation. The Security Stock Food Glutenized, that will prevent or overcome all the ills that horse, cow, cattle, colt, sheep, or hog flesh is heir to, differs from Security Poultry Food, Albuminized, which is invaluable for young chicks, ducks, turkeys and geese, by *not* containing charcoal.

A correspondent claimed that the United Breeders Dairy Food, made by the United Breeders Company of America, was locally sold as a food and not as a medicine. It was accordingly sampled and analyzed. It does not claim to be a food in the usual sense of that word, but is "a tonic for purifying the blood." The manufacturers use ground linseed as a basis, instead of wheat bran, the foundation of the two other condimental foods here reported upon. It contains in addition to the flax seed the usual "simples," such as fenugreek, sulphur, charcoal, common salt, Epsom salts, etc. The analyses of the three condimental foods follow:

	Security Food, Poultry Food, Albuminized, per cent.	Security Stock Food, Glutenized, per cent.	United Stock Breeders Stock Food, per cent.
Water	7.26	5.70	8.23
Ash	25.42	31.18	13.68
Protein	11.88	11.88	26.63
Fiber and charcoal.....	8.80	5.53	18.70
Nitrogen free extract.....	36.63	35.91	25.15
Ether extract.....	10.01	9.80	7.61

LOW GRADE AND HIGH GRADE COTTONSEED MEAL COMPARED.

J. M. BARTLETT.

The work here reported was undertaken in order to compare the value of the low grade cottonseed meals, which are sometimes found on the market, with that of high grade goods, and to point out to the consumer the desirability and economy of purchasing only the best of this class of foods.

Cottonseed meal is a highly nitrogenous feed, manufactured from the decorticated seed in the cotton growing regions of the South. The best meal is of a light yellow color, quite free from lint and hulls, and has a fine nutty flavor.*

COTTONSEED MEAL AS A FEED.

Cottonseed meal has been extensively fed to cows in the New England States for the past 20 years and stands pre-eminent among nitrogenous feeds as the most economical source of protein. Practical experience, supplemented by carefully conducted experiments, both in the United States and Europe, has demonstrated the high feeding value of this material for all kinds of farm animals, with the possible exception of horses, calves and pigs. Its value for producing meat, milk and butter have long been established. It is the most highly nitrogenous of the feed stuffs on the market, and is, therefore, the most economical for balancing rations of feeds deficient in protein, such as corn silage, timothy hay, corn meal, etc. The price has advanced considerably of late years, owing partly to its more extensive use in the South and West for fattening steers, and partly to the advance in price of other feed stuffs.

* For a full description of the process of manufacture of cottonseed meal see Farmers Bulletin No. 36 of the U. S. Dept. of Agriculture, which can be obtained free from Members of Congress.

EFFECT ON THE HEALTH OF ANIMALS.

The injurious effects of feeding cottonseed meal to pigs and calves have been observed and the cause has been made a subject of careful investigation. It is still an open question whether the injurious principle is an original constituent of the cottonseed products, whether it is developed as the result of decomposition before feeding or of a change within the animal body. There is always danger of injurious or poisonous principles being produced in materials rich in protein when they undergo fermentation, and on this account fermented materials of high nitrogen content should be avoided.

All experience goes to show that fresh cottonseed meal can be safely fed to beef cattle, milch cows, and sheep, but on account of its extreme richness it should be used only in connection with less concentrated feeds and should never be fed in large quantities. Two to 4 pounds per day, fed with silage or bran and corn meal, is as much as a milch cow should receive.

FERTILIZING VALUE.

Cottonseed meal is used quite extensively in some sections of the country as a fertilizer. A good grade meal will carry about 6.8 per cent nitrogen, 2.9 per cent phosphoric acid and 1.8 per cent potash. Based upon the valuations that will be used by New England experiment stations in 1905 for computing the value of commercial fertilizers, a meal analyzing as above will be worth about \$29 a ton as a fertilizer. Notwithstanding its high value when used directly in this way, it will usually be found more economical to use it as a feed for stock and to apply the resulting manure to the land. When thus used, from 80 to 95 per cent of the nitrogen and phosphoric acid and practically all of the potash will be contained in the manure.

HOW CAN THE FARMER DISTINGUISH BETWEEN GOOD AND POOR MEAL?

As the demand increases and the price advances, the temptation to adulterate or put inferior goods on the market becomes greater. Consequently from time to time there appear in our eastern markets inferior lots of cottonseed meals, and probably

many more would be found if the inspection laws did not drive them out. In spite of the laws, occasionally bad lots may appear, and it is essential that the farmer should be able in a measure to tell the quality of goods himself. The first thing for him to look for is the guarantee tag, required by law, giving the name of the manufacturer and composition of the goods. A first-class cottonseed meal should contain over 40 per cent protein and about 9 per cent fat. It should be a light yellow color. If it is dark in color with many fine black specks, it indicates that ground hulls have been added. If it is a rusty brown color, it indicates that the meal is old or the material has at some time undergone fermentation. Such meals are not safe to use. The texture of the meal should be about the same as finely ground corn meal, and it should be practically free from cotton lint. The presence and amount of lint can be determined by sifting a portion in a flour or meal sieve. The cotton fiber will remain in the sieve. The lint and hulls are also quite easily detected by stirring the meal up with water. Put one teaspoonful in half a glass of water, mix thoroughly and allow the mixture to stand a few minutes to settle. The black hulls will be found on the bottom and can be seen through the glass. The good meal will be in the next layer and the lint on top. A first-class meal should show only a few black hulls and scarcely any lint.

An expert can judge very well of the quality of cottonseed meal by means of tasting. The best fresh meals have a very agreeable nutty flavor not found in inferior goods. The presence of much fiber is readily noted by the sense of touch in the mouth. The absence of the nutty flavor and the presence of a rancid taste indicates that the meal is old.

DIFFERENT GRADES OF COTTONSEED MEAL.

Roughly speaking, the meals which are in the market can be divided into four groups.

A. The high grade meal, carrying 43 or more per cent protein; bright yellow in appearance, free from cotton and hull, and with a sweet nutty flavor.

B. A dark colored cottonseed meal, analyzing not very differently from the preceding, but made from seed that has undergone more or less fermentation.

C. A medium grade goods which carries considerable cotton and some hull, very good in color, but of poor flavor. Such meal will usually carry about 35 per cent protein.

D. A cottonseed meal of very good appearance, with the hulls and cotton so finely ground as not to be readily detected. This class is, however, lacking in the good flavor of high grade meals. Such meal will usually carry about 25 per cent protein and because of its good appearance is the most dangerous adulterated meal in the market.

COMPOSITION OF THE COTTONSEED MEAL USED IN THIS EXPERIMENT.

When this study was undertaken, the two grades of cottonseed meal referred to as A and B in the preceding paragraph, were readily found. About this time a jobber received several car loads of a meal of "grade C" and because of its poor appearance sent samples to the Station for analysis. These goods proved so poor that they were shipped out of the State, but the jobber kindly furnished us with enough for the purpose of this investigation. It was only after considerable correspondence that we were able to obtain from a Massachusetts house enough of the poorest grade ("D") cottonseed meal for the experiments here reported.

COMPOSITION OF THE COTTONSEED MEALS STUDIED.

The description of the samples and the analyses of the four grades of cottonseed meal follow.

Cottonseed meal A was prime meal in color, taste and composition.

Cottonseed meal B was of good texture and carried but little lint or hulls. It was, however, dark in color. This together with its higher water content indicates that it had undergone some, probably slight, fermentation.

Cottonseed meal C was a medium grade goods with considerable lint and hulls. It was of good color, but poor flavor.

Cottonseed meal D appeared at first glance to be fairly good. It was of good color and apparently contained but little lint or hulls. It was lacking in the nutty flavor of the high grade meals and was, as the analysis shows, very low grade goods.

Composition of the samples of the four grades of cottonseed meal here reported upon.

	Station number.	Water-- per cent.	Ash-- per cent.	Protein-- per cent.	Crude fiber-- per cent.	N-free extract-- per cent.	Ether extract-- per cent.
A--Very high grade	4311	8.01	7.59	46.75	6.23	21.64	9.78
B--Dark colored	4423	12.72	7.05	42.50	7.67	14.64	8.62
C--Medium grade.....	4424	11.60	6.50	34.13	13.58	19.83	8.90
D--Very low grade	4425	9.52	4.70	23.81	21.43	30.53	6.20

As cottonseed meal is chiefly used in this State to supplement feeding stuffs poor in protein, this constituent is of the first importance. The very low grade meal (D) carried about one-half as much protein as the best grade. The uniform relation between the protein content of the meal and that of woody fiber is noteworthy; as the crude fiber increases, the protein decreases.

THE DIGESTIBILITY OF DIFFERENT GRADES OF COTTONSEED MEAL.

The chemical analysis of a feeding stuff helps to an understanding of its food value, but the real value is more clearly brought out by actual feeding trials. The four grades of meal were fed to sheep and their differences in digestibility and feeding values are shown in the tables which follow.

The digestion coefficients obtained on the different grades of cottonseed meal with sheep.

	Station number.	Dry matter-- per cent.	Organic matter-- per cent.	Protein-- per cent.	Crude fiber-- per cent.	N-free extract-- per cent.	Fat-- per cent.
A--Very high grade	4311	90.0	95.3	83.3	95.9	100
B--Dark color.....	4423	85.8	89.9	82.2	94.7	97.2
C--Medium grade.....	4424	73.0	78.0	83.6	43.5	82.1	94.6
D--Low grade.....	4425	61.4	64.1	72.6	37.8	67.8	90.1

Pounds of digestible nutrients in 100 pounds of the different grades of cottonseed meal and their comparative money values as a source of protein.

	Organic matter-- pounds.	Protein-- pounds.	Nitrogen- free ext-- pounds.	Fat-- pounds.	Value per hundred.
A--Very high grade.....	80.4	39.0	20.8	9.78	\$1 40
B--Poor color.....	72.2	35.0	13.9	8.4	1 25
C--Medium grade.....	63.9	28.5	16.3	7.3	1 02
D--Low grade.....	55.0	17.3	16.5	5.6	0 62

According to the analyses alone, the low grade goods would be worth about half as much as the high grade, but as a matter of fact they are worth less than half, for the reason that the protein is of poorer quality and less digestible than that of the high grade goods. The coefficients for the organic matter and protein of the low grade goods are only 64.1 and 72.6 per cent respectively, while those of high grade are 95.3 and 83.3 per cent. The pounds of digestible protein in 100 pounds of the low grade goods is considerably less than half that of the high grade, and if the high grade meal is assumed to be worth \$1.40 per 100 pounds on the basis of its digestible protein, 100 pounds of the low grade meal are worth only 62 cents. As the difference in price on the market for the different grades of goods is only slight, rarely more than one or two dollars per ton, the above results show how very necessary it is for a buyer of cottonseed meal to know the quality of the goods he is getting. To the ordinary observer meal classed as "D" would look nearly as good as that called "A." The excess of hulls it contains are so finely ground that they do not show unless separated by mixing with water, so the color is very good and many buyers would be tempted to purchase it if the price were 10 or 15 cents a hundred lower than that of the high grade.

Such figures as those of the tables are at least suggestive to the users of cottonseed meal. They point out the importance of care in the purchase and use of this class of goods and justify the feeding stuffs inspection laws which have almost entirely driven the lowest grades out of the State.

FREE ANALYSIS OF FEEDING STUFFS.

The Station officers take pain to obtain for analysis samples of all feeding stuffs coming under the law, but the co-operation of consumers is essential for the full and timely protection of their interests. Whenever anyone believes that this law is being evaded in any way, he is requested to notify the Director of the Station.

The Station will promptly analyze samples of feeding stuffs sold in Maine taken in accordance with the following directions, and report the results without any charge to the interested parties. Dealers and consumers are urged to avail themselves of this offer.

DIRECTIONS FOR SAMPLING.

The sample should fairly represent the feeding stuff and is best obtained as follows:

Open one or more full and unbroken packages, and mix well together the contents of each for a foot in depth, take out three cupfuls from different parts of the mixed portions of each package, pour them one over another upon a paper, intermix thoroughly, and fill a tin spice or baking powder box from the mixture. Upon paper plainly write (1) the name of the goods; (2) the name of the manufacturer; (3) the guaranteed percentages of protein and fat; (4) the name and address of the dealer; and (5) the name and address of the sender. Securely wrap the box and description of sample in paper and send by mail to the

Agricultural Experiment Station,

Orono, Maine.

